

A FURTHER NEW SUBSPECIES OF *DELIAS MESSALINA* ARORA (LEPIDOPTERA: PIERIDAE) FROM NEW IRELAND, PAPUA NEW GUINEA

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Abstract

Delias messalina gerritsi subsp. n. is described and illustrated from central New Ireland. Its external facies are compared in detail with those of *D. m. lizae* Müller from southern New Ireland and their isolating mechanisms are briefly postulated.

Introduction

Arora (1983) described *Delias messalina* Arora from the Solomon Archipelago, as the nominotypical subspecies from Bougainville, Papua New Guinea and as *D. m. orientalis* Arora from Guadalcanal and Santa Isabel, Solomon Islands. The latter locality is considered likely to be erroneous (Tennent 2002). The type series of *D. m. messalina* was taken during the late 1950s by Sir William Brandt close to, but prior to the discovery of, the Panguna copper-gold deposit in central Bougainville.

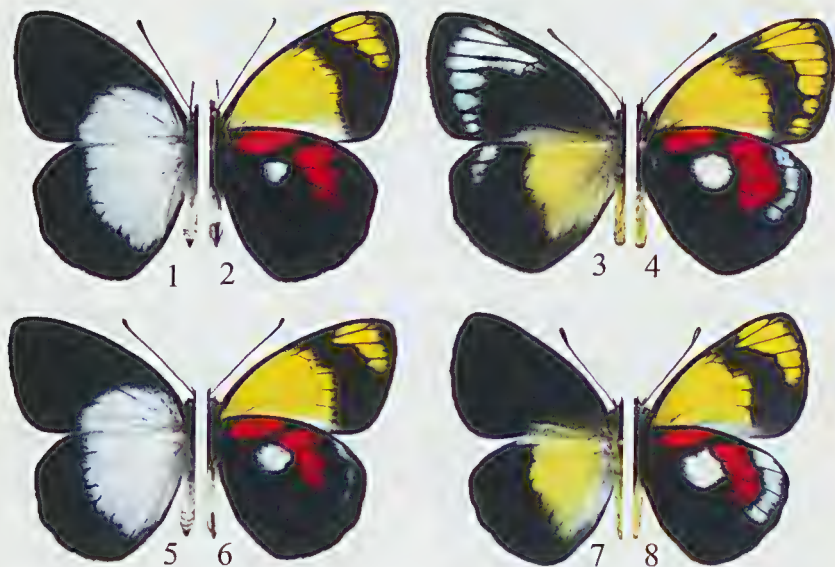
D. messalina was first recorded from the Bismarck Archipelago, Papua New Guinea, by Parsons (1989), who described *D. m. vigasa* Parsons from East New Britain. Subsequently, *D. m. lizae* Müller (Figs 1-4) was described from high altitudes in the Hans Meyer Range, southern New Ireland (Müller 1999), with additional localities recorded by Müller (2001). Male specimens from the Schleinitz Mountains in central New Ireland were noted by Müller (2001) to be quite distinct from those collected in southern New Ireland.

Collecting in recent years has yielded females of *D. messalina* from central New Ireland that are consistently very different from those of *D. m. lizae*. These and their associated males from the Schleinitz Mountains are described below as a new subspecies.

Delias messalina gerritsi subsp. n.

(Figs 5-8)

Types. Holotype ♂, PAPUA NEW GUINEA: New Ireland, Schleinitz Mts, 1350 m, 4.ix.2005, C.J. Müller, in Australian National Insect Collection, Canberra. *Paratypes:* 1 ♂, 1 ♀, same data as holotype, in C.J. Müller collection, Sydney; 1 ♂, same data as holotype except 24-26.x.2000, in C.J. Müller collection; 1 ♂, same data as holotype except 24-26.x.2000, in Mike Carr collection, London; 1 ♂, same data as holotype, in J. Jakusch collection, Germany; 1 ♀, same data as holotype except xii.2005, in L. Wills collection, Wellington; 1 ♀, same data as holotype except 20.x.2005, in J. Jakusch collection.



Figs 1-8. *Deliás messalina* from New Ireland. Odd numbers upperside, even numbers underside. (1-2), *D. m. lizae*, male; (3-4), *D. m. lizae*, female; (5-6), *D. m. gerritsi*, male; (7-8), *D. m. gerritsi*, female. All figures 0.75 x natural size.

Description. Male (Figs 5-6). Forewing length 30 mm; antenna 16 mm. Head black, clothed with dense, deep grey hairs; labial palpus black; eye ringed with pale yellow anteriorly; antenna black, tipped white ventrally. Thorax black with long grey hairs dorsally, beneath black; legs black. Abdomen white, narrow black dorsal ridge, tapered posteriorly; claspers grey. Forewing upperside with ground colour black; basally light grey in an arcuate manner from approximately 1/8 along costa to junction of veins CuA_1 and cell and to dorsum 1/4 of distance from apex; underside black with bright yellow subapical band from costa to vein M_3 , vestigial between veins R_3 and R_{4+5} and intruding abruptly between veins R_3 and M_2 ; base to postmedian area brilliant yellow, abruptly changing to white below vein $1A+2A$; costa broadly black to vein Sc . Hindwing upperside with ground colour as in forewing; a large basal to median/postmedian light grey area extending from costa near apex to end of cell and to dorsum, about 2/3 of distance towards tornus, congruent with termen; underside with ground colour black; a large, pure white spot in cell and beyond; a large, basal scarlet patch extending to vein R_s , rounded distally; one vestigial and two large scarlet markings in median area between costa and vein M_2 , becoming irregular distally; a band of light grey scales near apex between veins R_s and M_3 .

Female (Figs 7-8). Forewing length 30 mm; antenna 17 mm. Head, antennae, legs and labial palpi as in male. Thorax grey with dense, yellow-grey hairs; beneath black. Abdomen yellow, with narrow black dorsal line, tapering posteriorly; beneath cream-yellow. Forewing with costa and termen slightly bowed; dorsum slightly concave; upperside black with deep greenish basal area, progressively becoming yellow-green and extending to postmedian area at dorsum; underside black with large, pure white spot in cell and reaching beyond intersections of veins Rs and M₁; a large, scarlet basal patch above cell and reaching vein Rs; a broad, conspicuous band of scarlet spots between costa and vein M₃, in postmedian area; a band of silvery-grey markings from veins Sc to R₁.

Etymology. This striking taxon is named in honour of Dr Godfried Gerritts of Buderim, Queensland who, over the years, has contributed significantly to our knowledge of the genus *Delias* Hübner.

Distribution. Known only from the Schleinitz Mountains, central New Ireland, Papua New Guinea.

Discussion

Delias messalina gerrittsi shows consistent, distinctive characters when compared with other subspecies of *D. messalina*, even *D. m. lizae*, which is known to occur within 200 km of *D. m. gerrittsi*.

The males of *D. m. lizae* and *D. m. gerrittsi* are similar in colouring on both wing surfaces, except that the former possesses a subtle, dull greenish lustre to the black areas on the upperside. Additionally, the wings of *D. m. lizae* males are more acute than those of *D. m. gerrittsi* and, in all cases examined, males of the former are distinctly larger than those of *D. m. gerrittsi*. The white spot on the hindwing underside of *D. m. gerrittsi* is not circular as in *D. m. lizae*, nor is it confined to the cell. There is no red colouring between costa and postmedian band, unlike *D. m. lizae*, and there is a well developed submarginal band of light grey scales on the hindwing underside. Males show some similarity to those of *D. m. vigasa* from New Britain.

Females of subspecies *D. m. lizae* and *D. m. gerrittsi* are very distinctive. In addition to the size and wing shape differences, the absence of white submarginal spots on the upperside in *D. m. gerrittsi* is particularly notable. The pale area along the inner margin on the forewing upperside is grey-cream in *D. m. lizae* and yellow in *D. m. gerrittsi* and, in the latter, the hindwing costa is distinctly white and extends towards the termen. The undersides of the two subspecies are also distinctive; that of *D. m. gerrittsi* is similar in both sexes but the light grey submarginal band is much broader in the female than in *D. m. lizae*.

Parsons (1998) noted the disjunct affinity between the then known subspecies of *D. messalina* occurring in the Solomon Archipelago and New Britain. He

observed the similarity between *D. m. vigasa* (from New Britain) and *D. m. orientalis* (from Guadalcanal), whereas the nominate subspecies (from Bougainville) possessed some unique characters. Indeed, the upperside of the female in *D. m. gerritsi* resembles that of *D. m. messalina*, further emphasising the disjunctive distribution of 'similar subspecies'. However, all subspecies possess combinations of the morphological characters assessed in this work and there are no characters that are unique to a single described subspecies. Both subspecies occurring in New Ireland (*D. m. lizae* and *D. m. gerritsi*) are distinct from other subspecies in that they bear a lateral white spot on the thorax, which is otherwise wholly black and there is no yellow patch at the base of the hindwing underside along the costa, a character present in other subspecies.

The occurrence of two distinct subspecies of the same species on a single island in the Pacific is intriguing and has implications for the geological evolution of New Ireland. The Hans Meyer Range and Schleinitz Mountains in New Ireland, the habitats for *D. m. lizae* and *D. m. gerritsi* respectively, endured very separate genesis, both temporally and in style. The former range is almost entirely composed of andesitic volcanics which formed as an island arc during the late Miocene, approximately 10-15 million years ago, whereas the thick limestone sequence comprising the Schleinitz Mountains formed when sea floor sediments were uplifted along the northern edge of the Bismarck Plate much earlier, approximately 20 million years ago. It is suggested here that these two ranges were separated by sea until fairly recently, owing to the low-lying coronus (uplifted coral reef) that predominates for several tens of kilometres, east of Namatanai, New Ireland (C.J. Müller, pers. obs.). Such geographic isolation would undoubtedly have allowed for genetic divergence and phenotypic differentiation between populations of *Delias messalina* occurring on each mountain range.

Such disjunct morphological patterns between populations from these two mountain ranges in New Ireland have not been recognised in any other butterfly taxa. In particular, other *Delias* species collected in both ranges (*D. eximia* Rothschild, *D. totila* Heller, *D. narses* Heller, *D. bagoe* Boisduval, *D. madetes* Godman & Salvin and *D. brandti* Müller) show no noticeable contrast. In New Ireland, *D. messalina* appears to be confined to elevations above 1400 m, whereas the other taxa, except the higher altitude *D. brandti*, have been collected at 1000 m and occasionally lower, hence reducing the physical, geographic separation between the Hans Meyer Range and Schleinitz Mountains populations. Similar patterns may be observed in *Delias* species complexes in mainland New Guinea, where the highest degree of recent speciation appears to have occurred at higher altitudes, where populations are widely spaced. Population-style phylogenetic studies of *D. messalina* would likely constrain the timing of separation between the subspecies.

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